

## EXECUTIVE SUMMARY

*The Waste Isolation Pilot Plant (WIPP), located near Carlsbad, New Mexico, is the nation's only operating deep geologic repository for nuclear waste and is responsible for safely disposing of defense-related transuranic (TRU) wastes. Public Law 104-201, the WIPP Land Withdrawal Act (LWA), as amended, requires the Secretary of Energy to submit to EPA documentation of WIPP's continued compliance with final disposal regulations, 40 CFR Part 191, Subparts B and C, not later than five years after initial receipt of TRU waste for disposal at the repository, and every five years thereafter until the end of the decommissioning phase of the project. The first five-year period since the start of waste receipt ends in March 2004, and this Compliance Recertification Application (CRA) has been prepared by the Department of Energy (DOE) to demonstrate continuing compliance and to seek recertification of WIPP.*

*It is estimated that approximately 115,000 m<sup>3</sup> of TRU wastes have been generated and are currently stored at government defense installations across the country. Additional TRU wastes are projected to be generated as a result of the ongoing decommissioning and dismantlement of TRU waste sites. Waste disposal operations at the WIPP were initiated on March 26, 1999, after the Environmental Protection Agency (EPA) certified that the WIPP facility complies with the final disposal regulations. EPA's certification of WIPP in May, 1998, followed the submittal by the DOE of the Compliance Certification Application (CCA) in October 1996. The first application demonstrated how the geological, hydrological, physical, chemical, and environmental characteristics of the site, along with engineered features of the facility, lead to a reasonable expectation that compliance will be maintained for the required 10,000-year regulatory period.*

*As required by the relevant portions of 40 CFR Parts 191 and 194, this CRA addresses a wide range of topics. It incorporates portions of the CCA that remain valid and provides updates in those areas where approved change has occurred, and where new data have been gathered and analyzed. It also responds to specific requests EPA has made for new or expanded information. Topics addressed in this CRA include (but are not limited to) the following:*

- Natural and engineered features of the disposal system, including geology, geophysics, and hydrogeology of the repository and its environs, as well as the geochemistry of disposal system/waste interactions;*
- Assessments of the disposal system's long-term performance, including the input parameters used in those assessments;*
- Criteria for accepting waste at WIPP and the programs and activities that ensure adherence to those criteria;*
- Inventory of TRU waste emplaced in the repository, in existence at TRU waste sites, and estimates of TRU waste to be generated as a result of defense-related activities at those TRU waste sites;*

- 1 • *Reassessment of WIPP-relevant features, events, and processes (FEPs), in light of data*  
2 *acquired since WIPP's original certification, to ensure that assessments of repository*  
3 *performance account for all important aspects of the disposal system;*
- 4 • *Individual and groundwater protection standards and DOE's expectations that WIPP*  
5 *will meet or exceed those standards; and*
- 6 • *Assurance requirements, including active and passive institutional controls,*  
7 *monitoring, extent and impact of natural resource extraction, and possible removal of*  
8 *waste.*

9 *The CRA generally follows the format of the CCA, but is modified to include new information*  
10 *and to respond to the guidance given by the EPA on the content of this first CRA. As*  
11 *approved by the EPA, portions of the original CCA have been brought forward and modified*  
12 *for this application; other portions of the CCA have been incorporated by reference.*  
13 *Presuming EPA approval of DOE's request for WIPP recertification, the cumulative impact*  
14 *of these changes would be to create a new and updated compliance baseline for WIPP.*

15 *This application incorporates information about, and assessment of, several changes proposed*  
16 *by the DOE and approved by the EPA (or requested by the EPA itself) since the original*  
17 *certification. These changes involve many aspects of the repository and the systems and*  
18 *processes associated with it. The most important of these changes include the following:*

- 19 • *Inventory: Estimates used in the CCA describing TRU waste to be disposed of at*  
20 *WIPP have been fully updated. In addition, information about waste actually*  
21 *emplaced at WIPP has also been compiled. The updated waste information has been*  
22 *incorporated into WIPP performance assessments (PAs) conducted for and described*  
23 *in this CRA.*
- 24 • *Repository Configuration: DOE requested approval from the EPA for a small change*  
25 *in the horizon at which the repository is mined in order to facilitate ground control and*  
26 *enhance the safety of WIPP's underground facility workers.*
- 27 • *Panel Closure: In its original certification, the EPA stipulated that panel closures*  
28 *should be constructed using a specific design (known as "Option D"). The*  
29 *performance of this design has been implemented in the 2004 PA, as opposed to the*  
30 *generic panel closure design included in the 1996 PA.*
- 31 • *Disposal Operations: Considering the extensive creep closure of excavations in Panel*  
32 *1, DOE requested approval from the EPA to bypass certain rooms as that panel was*  
33 *filled with waste.*
- 34 • *Engineered Barrier: DOE requested approval from EPA to eliminate emplacement of*  
35 *so-called magnesium oxide (MgO) "mini-sacks" among the stacks of waste containers*  
36 *in the repository, while retaining the bulk of the MgO in the "supersacks" placed on*  
37 *top of the waste drums.*

- 1 • Waste Characterization: DOE requested approval from EPA for updates to the WIPP  
2 Waste Acceptance Criteria (WAC). EPA approved with conditions, which DOE  
3 fulfilled.
- 4 • Performance Assessment: A number of changes have been implemented in DOE's  
5 approach to assessing the long-term performance of the repository.
  - 6 – To enable modeling of the repository to make the representation of the shafts and  
7 of the repository geometry more appropriate, and to explicitly include the Option D  
8 panel closure system, DOE modified 3 of the 24 conceptual models employed in  
9 PA: disposal system geometry, repository fluid flow, and disturbed rock zone.  
10 These changes were extensively examined by a peer review panel and were found to  
11 be reasonable and appropriate.
  - 12 – Responding to EPA's guidance that a fourth conceptual model needed  
13 modification, a new model was developed to predict possible spall releases, and was  
14 submitted to a peer review. That panel judged the revised model to be reasonable  
15 and appropriate.
  - 16 – A single PA parameter set has been implemented for this CRA, rather than  
17 maintaining two – one used in the creation of the CCA and the other resulting from  
18 PA verification tests mandated by the EPA as part of its consideration of the CCA.
  - 19 – Upgrades have been made to computing hardware to optimize computational  
20 performance and to key software components of the WIPP PA system, including  
21 operating systems and database software. These upgrades also permit DOE to  
22 avoid obsolescence of its PA computing environment.

23 *These changes were requested and approved individually at various times since EPA's*  
24 *original certification of WIPP. This CRA assesses the combined effect of these changes on*  
25 *the compliance of the facility and demonstrates, as highlighted in those portions of the CRA*  
26 *that detail the results of analyses, that the combined effect does not impact compliance. The*  
27 *total normalized release from the repository remains well below the limits specified in the*  
28 *containment requirements of 40 CFR Part 191, Subpart B. Similarly, the compliance analysis*  
29 *performed on the undisturbed repository results in a single postulated release whose value is*  
30 *significantly smaller than even the very small release values generated by the same analysis in*  
31 *the CCA. Both the CCA and the CRA compliance analyses demonstrate that WIPP complies*  
32 *with the individual and groundwater protection standards promulgated in 40 CFR Part 191,*  
33 *Subpart C. When considered with information in this CRA pertaining to other regulated*  
34 *aspects of TRU waste characterization and disposal, these PA and compliance analysis results*  
35 *amply demonstrate WIPP's continued compliance with all applicable laws, regulations, and*  
36 *long-term disposal standards.*

37 *The DOE maintains, therefore, that WIPP continues to comply with the governing laws and*  
38 *regulations and that the repository should be recertified by the EPA for another five years of*  
39 *operation.*